Memorandum

TO: Nick Brand

FROM: Michael Snavely, Rachel Copperman, Yushuang Zhou, George Mazur

DATE: August 17, 2010

RE: Alternative Station Configurations in the San Fernando Valley - FINAL

Two year 2030 Full System scenarios were modeled to test alternative station locations in the San Fernando Valley. Each scenario included the same overall level of high-speed rail (HSR) operations featured in the May 2009 operating plan, and the higher station parking rates included in the *Increased Parking Cost Scenario*. These alternatives test the effects of:

- **Burbank North Station Scenario**: Replaces the Sylmar and Downtown Burbank HSR stations with a single Burbank Airport station located at the intersection of North San Fernando Blvd and North Hollywood Way.

- **San Fernando Station Scenario:** Replaces the Downtown Burbank and Sylmar HSR stations with a single San Fernando station located between Maclay Avenue and Workman Street.

Figure 1 displays the HSR alignments and station alternatives within the San Fernando Valley.

Operating Plans

The operating plan for the *Burbank North Station Scenario* (see Table 1) is identical to the *Increased Parking Cost Scenario* with the exception that the Sylmar and Downtown Burbank stations are replaced by a new Burbank Airport station located 2.25 miles north of the Downtown Burbank station location indicated in the program-level document. Travel time through the San Fernando Valley decreases by 4 minutes for the three operating patterns (patterns 5, 15, and 25) that featured two San Fernando Valley stops (Sylmar and Downtown Burbank) in the *Increased Parking Cost Scenario*. Since Burbank Airport is further north than the Downtown Burbank station, travel times between Burbank Airport and points north decrease slightly, while times between Burbank Airport and points south increase slightly. Remaining train patterns are identical to the *Increased Parking Cost Scenario*.

555 12th Street, Suite 1600
Oakland, CA 94607
tel 510-873-8700 www.camsys.com **fax** 510-873-8701

Figure 1. San Fernando Valley HSR Station Alternatives

2030 Full System Ridership and Revenue Results

The operating plan for the *San Fernando Station Scenario* (see Table 2) is identical to that used in the *Increased Parking Cost Scenario* with the exception that the Sylmar and Downtown Burbank stations are replaced by a new San Fernando stop located roughly ½ mile south of the Sylmar Metrolink Station. As in the *Burbank North Station Scenario*, travel time through the San Fernando Valley decreases by 4 minutes on the three patterns that included stops at both Sylmar and Downtown Burbank under the *Increased Parking Cost Scenario*.

Burbank North Station Scenario

The 2030 full system forecast for this scenario resulted in a predicted annual HSR ridership of 93.1 million (see Table 3). This value represents a decrease of 0.6 million compared to the *Increased Parking Cost Scenario*. This drop can be largely attributed to a 0.6 million-passenger decline in ridership within North LA Basin (12 percent), and a decrease in travel within the LA Basin by 0.7 million riders (5.3 percent), due in large part to the reduction in station access. Systemwide interregional travel increases slightly (by 0.3 million riders) due to reduced travel times through the San Fernando Valley on three local train patterns. The greatest gains in interregional ridership occur in the LA Basin – San Diego, LA Basin – Bay Area, and San Joaquin Valley – LA Basin markets (about 0.1 million riders each).

Table 1. Full System Operating Plan for the Burbank North Station Scenario

Station	Run Time from Start Station (minutes)													
Pattern #	**0**	**1**	**2**	**29**	**28**	**4**	**20**	**41**	**42**	**14**	**39**	**25**	**15**	**35**
San Francisco	0	0	0	0	0	0	0			0	0			
Millbrae	|	|	|	|	15	15	15			15	|			
Redwood City/Palo Alto	|	20	|	20	25	25	25			25	20			
San Jose	|	35	30	35	40	40	40			40	35			
Gilroy	|	51	|	51	56	56	|			56	|			
Merced										91	|			
Modesto										108	|			
Stockton										124	104			
Sacramento										146	126	0	0	0
Stockton												22	22	22
Modesto												|	38	|
Merced												|	55	|
Fresno	|	|	|	|	97	97	93					68	78	68
Bakersfield	|	|	|	|	|	138	134					|	119	|
Palmdale	|	|	|	151	164	172	|				135	153	|
Burbank Airport	|	|	|	176	|	197	186					160	178	|
Los Angeles Union Station	160	175	163	188	198	209	198	0	0			172	190	154
City of Industry		|		208	218	|		19	|					174
Ontario		203		220	230	237		31	|					186
Riverside		216		233	243	250		44	35					199
Murrieta		|		250	260	|		61	|					216
Escondido		|		268	278	|		79	|					234
University City		258		283	293	292		94	|					249
San Diego		270		295	305	304		106	85					261
Norwalk	173		176				211					185	203	
Anaheim	184		187				222					196	214	
Frequency (trains per hour)	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Notes: "|" indicates no station stop for indicated pattern.

Table 2. Full System Operating Plan for the San Fernando Station Scenario

Station	Run Time from Start Station (minutes)													
Pattern #	**0**	**1**	**2**	**29**	**28**	**4**	**20**	**41**	**42**	**14**	**39**	**25**	**15**	**35**
San Francisco	0	0	0	0	0	0	0			0	0			
Millbrae	|	|	|	|	15	15	15			15	|			
Redwood City/Palo Alto	|	20	|	20	25	25	25			25	20			
San Jose	|	35	30	35	40	40	40			40	35			
Gilroy	|	51	|	51	56	56	|			56	|			
Merced										91	|			
Modesto										108	|			
Stockton										124	104			
Sacramento										146	126	0	0	0
Stockton												22	22	22
Modesto												|	38	|
Merced												|	55	|
Fresno	|	|	|	|	97	97	93					68	78	68
Bakersfield	|	|	|	|	|	138	134					|	119	|
Palmdale	|	|	|	151	164	172	|				135	153	|
San Fernando	|	|	|	173	|	194	183					157	175	|
Los Angeles Union Station	160	175	163	188	198	209	198	0	0			172	190	154
City of Industry		|		208	218	|		19	|					174
Ontario		203		220	230	237		31	|					186
Riverside		216		233	243	250		44	35					199
Murrieta		|		250	260	|		61	|					216
Escondido		|		268	278	|		79	|					234
University City		258		283	293	292		94	|					249
San Diego		270		295	305	304		106	85					261
Norwalk	173		176				211					185	203	
Anaheim	184		187				222					196	214	
Frequency (trains per hour)	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Notes: "|" indicates no station stop for indicated pattern.

Table 3. 2030 Full System Annual Region-to-Region Ridership and Revenue, San Fernando Valley Scenarios

Market	Increased Parking Cost Scenario				Burbank North Station Scenario				San Fernando Station Scenario			
	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)	HSR Ridership (Millions)	HSR Mode Share	HSR Avg. Fare (2008 Dollars)	Revenue (2008 Dollars in Millions)
LA Basin – Sacramento	3.8	50%	$66	$249	3.8	51%	$66	$251	3.8	51%	$66	$252
LA Basin – San Diego	20.8	15%	$31	$637	20.9	15%	$31	$640	20.9	15%	$31	$642
LA Basin – Bay Area	12.2	59%	$68	$827	12.3	59%	$68	$831	12.3	59%	$68	$833
Sacramento – Bay Area	2.8	4%	$45	$127	2.8	4%	$45	$126	2.9	4%	$45	$128
San Diego – Sacramento	0.1	4%	$77	$7	0.1	4%	$78	$6	0.1	4%	$78	$7
San Diego – Bay Area	3.4	38%	$81	$274	3.4	38%	$81	$276	3.4	38%	$81	$276
Bay Area – San Joaquin Valley	7.8	11%	$45	$354	7.8	11%	$45	$353	7.8	11%	$45	$354
San Joaquin Valley – LA Basin	8.2	11%	$44	$360	8.3	12%	$44	$367	8.3	12%	$44	$369
Sacramento – San Joaquin Valley	2.0	9%	$43	$86	2.0	9%	$42	$86	2.0	9%	$42	$86
San Diego – San Joaquin Valley	0.1	27%	$56	$5	0.1	26%	$57	$5	0.1	26%	$56	$4
Within Bay Area Peninsula	6.5	0.1%	$11	$71	6.5	0.1%	$11	$71	6.5	0.1%	$11	$71
Within North LA Basin	5.0	0.1%	$12	$61	4.4	0.1%	$12	$54	4.6	0.1%	$12	$57
Within South LA Basin	2.9	0.0%	$10	$30	2.9	0.0%	$10	$30	2.9	0.0%	$10	$30
North LA – South LA	5.5	0.2%	$11	$61	5.2	0.2%	$11	$58	5.4	0.2%	$11	$60
Within San Diego region	0.3	0.0%	$11	$3	0.3	0.0%	$11	$3	0.3	0.0%	$11	$3
Within San Joaquin Valley*	2.1	0.0%	$29	$62	2.1	0.0%	$29	$62	2.1	0.0%	$29	$62
Other *	10.3	0.1%	$53	$547	10.2	0.1%	$53	$543	10.4	0.1%	$53	$550
Total	**93.7**	**0.2%**	**$40**	**$3,763**	**93.1**	**0.2%**	**$40**	**$3,764**	**93.8**	**0.2%**	**$40**	**$3,784**
Within San Diego region	0.3	0.0%	$11	$3	0.3	0.0%	$11	$3	0.3	0.0%	$11	$3
Within Entire LA Basin	13.3	0.1%	$11	$153	12.5	0.1%	$12	$142	12.9	0.1%	$11	$147
Within Entire Bay Area	6.5	0.1%	$11	$71	6.5	0.1%	$11	$71	6.5	0.1%	$11	$71
Total Between Regions	**73.6**	**8.1%**	**$48**	**$3,536**	**73.9**	**8.1%**	**$48**	**$3,548**	**74.2**	**8.2%**	**$48**	**$3,563**

* "W/in San Joaquin Valley" and "Other" markets include interregional and intraregional travel.

Improvements in market-to-market ridership translate to a small ($1 million) overall rise in system revenue. An $11 million drop in revenues for travel within the LA Basin is offset by increases in higher-revenue interregional trips in the San Joaquin Valley – LA Basin ($7 million), LA Basin – Bay Area ($4 million), and LA Basin – San Diego ($3 million) travel markets.

In the *Burbank North Station Scenario*, average daily boardings decrease by 2,300 (0.8 percent) versus the *Increased Parking Cost Scenario*. Table 4 presents the average daily boardings at each HSR station. Boardings at the Burbank Airport station decline by 3,400 (20 percent) compared to both Burbank and Sylmar under the *Increased Parking Cost Scenario*, due largely to a 1,900/day reduction in intraregional trips from the station. This reduction is offset somewhat by slight increases in interregional daily boardings at nearby stations Anaheim, LA Union Station, and Norwalk.

San Fernando Station Scenario

The *San Fernando Station Scenario* resulted in predicted annual HSR ridership of 93.8 million (see Table 3), an increase of 0.1 million (0.1 percent) compared to the *Increased Parking Cost Scenario*. This small rise can be attributed to an increase of 0.6 million interregional riders (0.6 percent) due, in part, to decreased travel times through the LA Basin. The increase is offset by the loss of 0.4 million intraregional travelers (3.0 percent) within the LA Basin.

Increases in market-to-market ridership translate to a $21 million (0.6 percent) rise in system revenues over the *Increased Parking Cost Scenario*. Interregional total revenue increases by approximately $27 million (0.7 percent). The individual markets with the largest increase in revenues are LA Basin - San Joaquin Valley ($9 million, 2.5 percent), LA Basin – San Diego ($5 million, 0.8 percent) and LA Basin - Bay Area ($6 million, 0.7 percent). Revenue for trips within the LA Basin decreases by about $6 million (3.9 percent).

Overall, average daily boardings decrease by 300, or 0.1 percent (see Table 4). San Fernando Valley stations lose about 3,100 total daily boardings (18 percent) compared to the *Increased Parking Cost Scenario*. A 500 boarding decrease (3 percent) is also projected for Palmdale, while other stations are projected to have no change or a small increase in boardings.

Station Catchment Areas

Replacing the *Increased Parking Cost Scenario* San Fernando Valley stations with new stations at Burbank Airport or San Fernando alters the HSR station access decisions made by travelers in the area, as illustrated in Figures 2 through 4.

A Burbank Airport station offers less convenient access to residents in northern Los Angeles County, many of whom would use Palmdale or LA Union Station instead of a San Fernando Valley station. Alternatively, the San Fernando station appears to attract riders from roughly the same geographic area as the Burbank/Sylmar stations under the *Increased Parking Cost Scenario*, due in part to a station location that is more proximate to areas that are projected to have higher density development. This phenomenon is further explored in the following section.

Table 4. Station Boardings, San Fernando Valley Scenarios

Origin Station	Increased Parking Cost Scenario	Burbank North Station Scenario	San Fernando Station Scenario
San Francisco (Transbay)	34,500	34,500	34,600
Millbrae	5,700	5,700	5,700
Redwood City	7,500	7,500	7,500
San Jose	12,100	12,000	12,100
Gilroy	6,500	6,500	6,500
Sacramento	18,100	18,100	18,200
Stockton	6,300	6,400	6,400
Modesto/SP Downtown	4,400	4,300	4,400
Merced	2,500	2,500	2,500
Fresno	8,000	8,000	8,000
Bakersfield	8,100	8,100	8,200
Palmdale	16,400	16,200	15,900
Sylmar/San Fernando	12,900		13,900
Burbank/Burbank Airport	4,100	13,600	
Los Angeles (Union)	28,100	28,700	30,400
Norwalk	6,800	6,900	6,800
Anaheim	21,700	21,900	21,800
City of Industry	6,400	6,400	6,400
Ontario	10,600	10,500	10,600
Riverside	13,700	13,800	13,700
Temecula/Murrieta	7,100	7,100	7,200
Escondido	7,800	7,800	7,900
University City	5,900	5,900	5,900
San Diego (Downtown)	19,200	19,300	19,300
Daily	**274,100**	**271,800**	**273,800**

Population and Employment Density

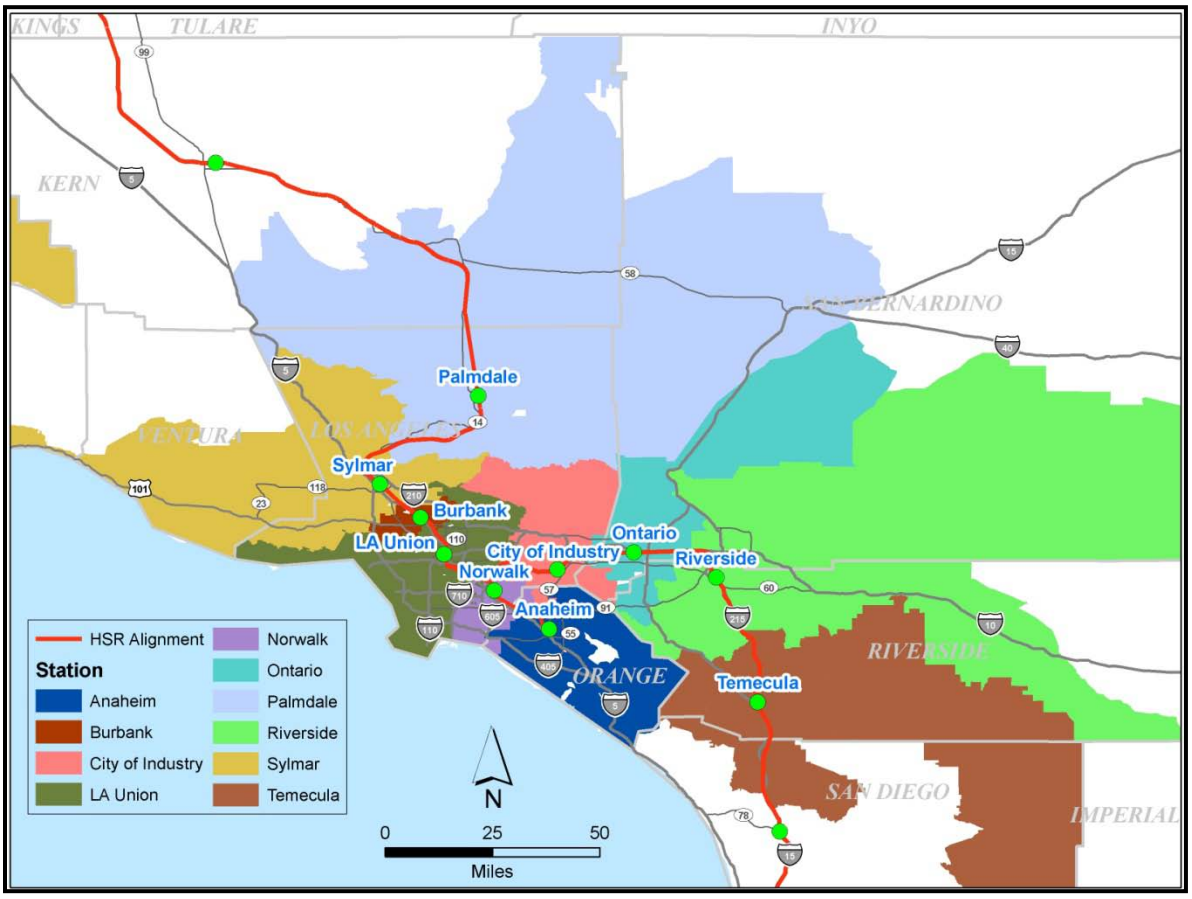
The Burbank Airport station serves an area of comparably lower population and job density than the Downtown Burbank station (see Figures 5 and 6), which likely contributes to the lower ridership projections for the *Burbank Airport Station Scenario*. Burbank further distance from high-density population centers in the Glendale area likely results in diversion of HSR trips to the LA Union Station. By contrast, the San Fernando station is located near the Sylmar station

in an area of similar population and employment density, and offers more convenient access to high-density population centers to the west of Burbank (e.g. Van Nuys and Panorama City) in the absence of a Downtown Burbank station. These more favorable population densities may explain, in part, the relatively higher HSR ridership projections for the *San Fernando Station Scenario*.

Table 5. Daily Line Loads, San Fernando Valley Scenarios

Origin Station	Destination Station	Increased Parking Cost Scenario	Burbank North Station Scenario	San Fernando Station Scenario
San Francisco (Transbay)	Millbrae	34,500	34,500	34,600
Millbrae	Redwood City	32,400	32,400	32,500
Redwood City	San Jose	34,400	34,300	34,500
San Jose	Gilroy	39,200	39,100	39,400
Gilroy	Merced	6,100	6,000	6,000
Gilroy	Fresno	33,700	33,700	33,900
Sacramento	Stockton	18,100	18,100	18,200
Stockton	Modesto/SP Downtown	23,700	23,800	23,900
Modesto/SP Downtown	Merced	26,700	26,700	26,800
Merced	Fresno	22,200	22,300	22,400
Fresno	Bakersfield	53,000	53,100	53,400
Bakersfield	Palmdale	49,100	49,200	49,600
Palmdale	Sylmar/San Fernando	55,900	55,500	55,900
Sylmar/San Fernando	Burbank/Burbank Airport	53,300	55,500	52,800
Burbank/Burbank Airport	Los Angeles Union	51,900	51,500	52,800
Los Angeles Union	Norwalk	25,100	25,500	25,300
Norwalk	Anaheim	21,700	21,800	21,800
Los Angeles Union	City of Industry	37,500	37,500	37,800
City of Industry	Ontario	39,800	39,700	40,100
Ontario	Riverside	39,700	40,000	40,100
Riverside	Temecula/Murrieta	36,200	36,400	36,500
Temecula/Murrieta	Escondido	32,000	32,200	32,200
Escondido	University City	24,700	24,900	24,900
University City	San Diego	19,200	19,300	19,300

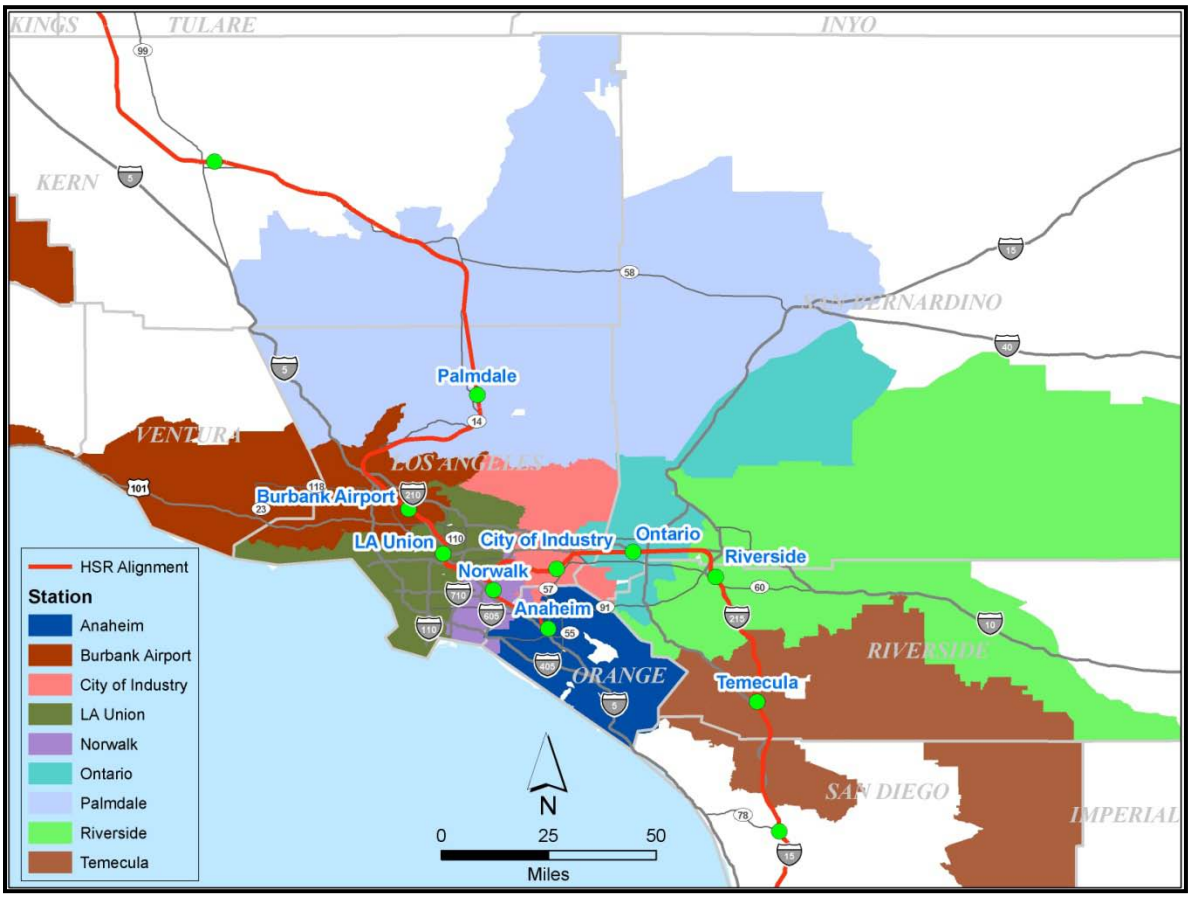
Figure 2. Station Catchment Areas for Increased Parking Cost Scenario



Analysis

Overall, these results suggest that at the system level, any of the three described station alternatives would generate roughly similar levels of ridership and revenue. The faster travel times for the *Burbank Airport Station Scenario* and *San Fernando Station Scenario* lead to higher levels of interregional ridership. However, the loss of a station in the San Fernando Valley in these two scenarios decreases regional accessibility, leading to a decrease in intraregional ridership. Portions of the northern San Fernando Valley and Santa Clarita are particularly impacted by the loss of intraregional accessibility associated with the *Burbank Airport Station Scenario.*

Figure 3. Station Catchment Areas for Burbank North Station Scenario



Additional Note

The information and results presented in this memorandum are estimates and projections that involve subjective judgments, and may differ materially from the actual future ridership and revenue. This memorandum is not intended nor shall it be construed to constitute a guarantee, promise or representation of any particular outcome(s) or result(s). Further, the material presented in this memorandum is provided for purposes of supporting high speed rail planning-level analyses, and is intended to assist in identifying relative differences between potential alignment and station alternatives.

Figure 4. Station Catchment Areas for San Fernando Station Scenario

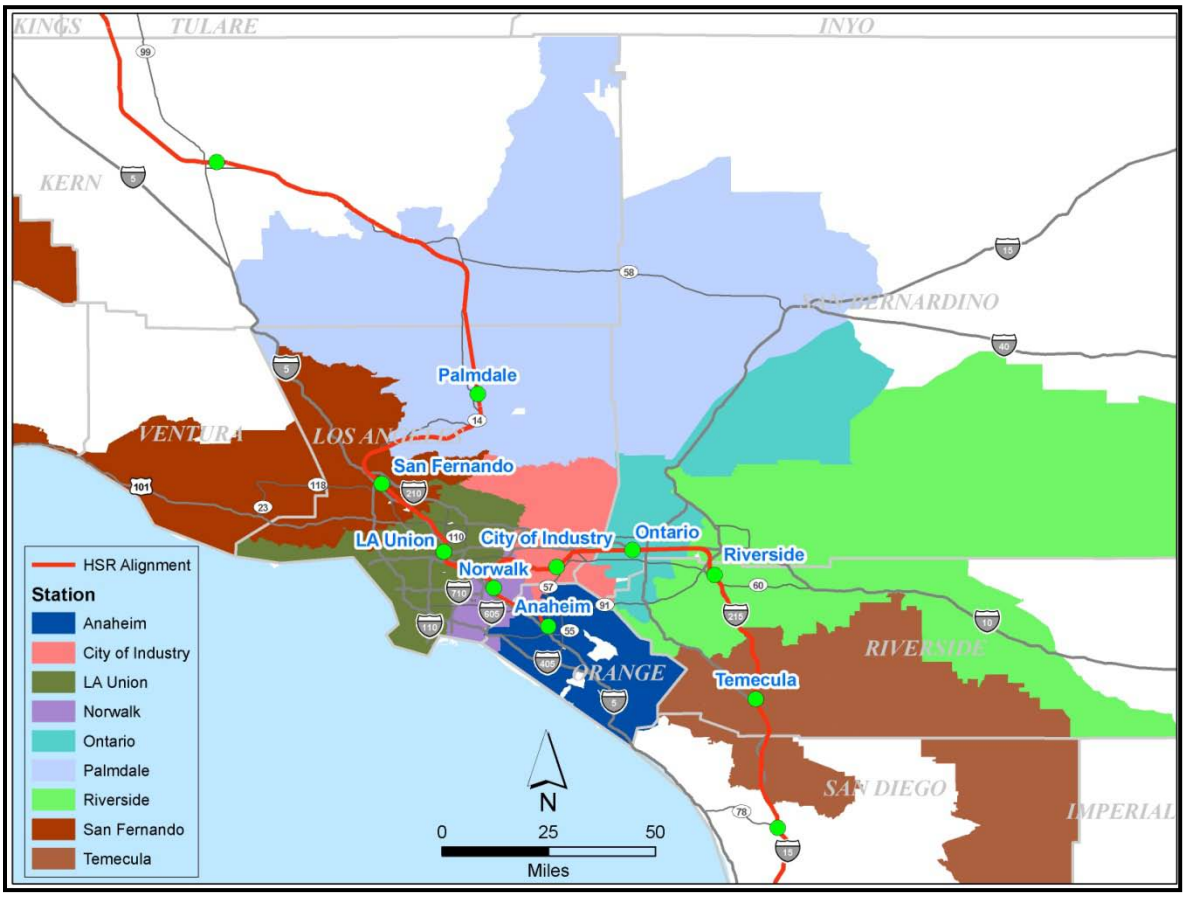


Figure 5. Year 2030 Projected Population Density (people per square mile)

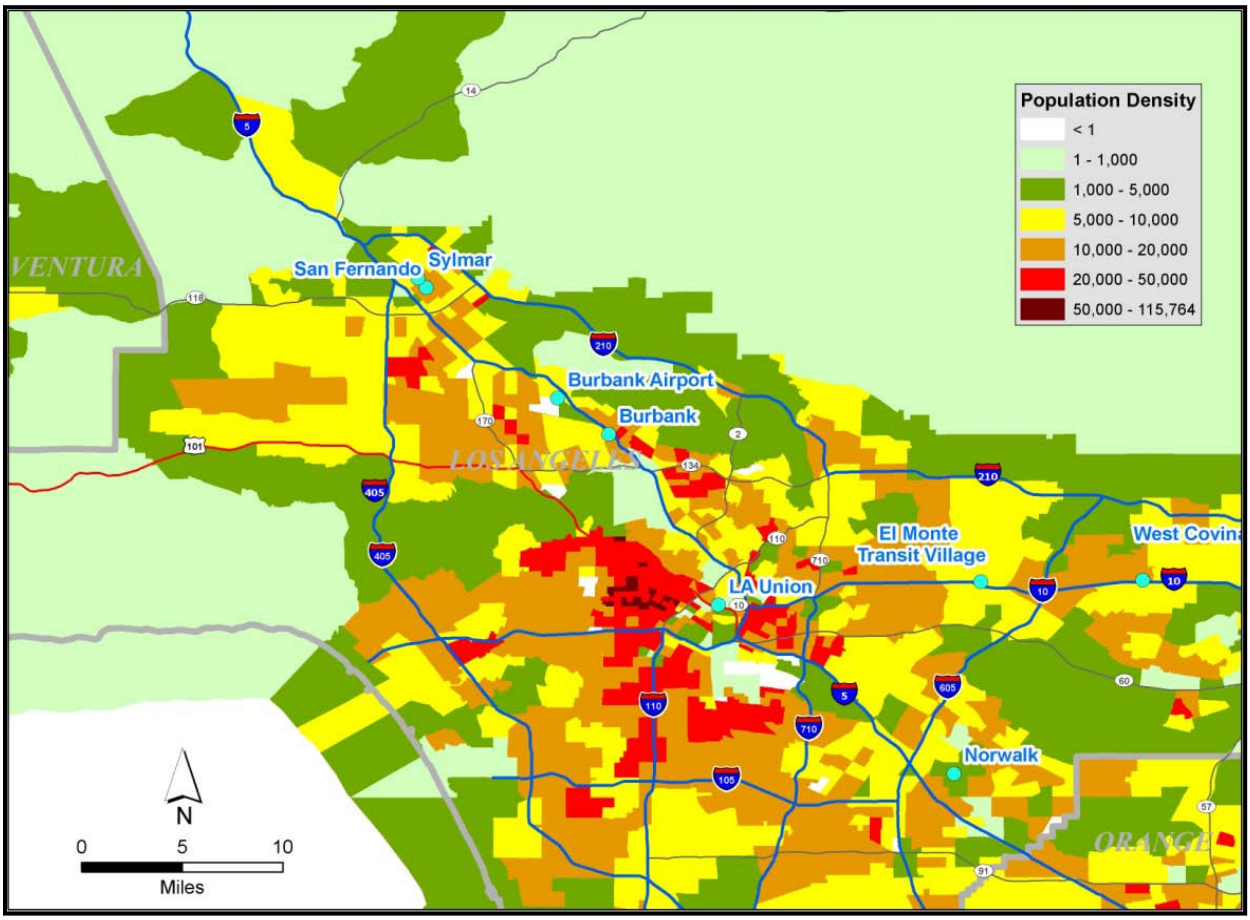


Figure 6. Year 2030 Projected Employment Density (jobs per square mile)